Remarks

In view of the foregoing amendments and following remarks responsive to the Office Action dated January 25, 2006, Applicant respectfully requests favorable reconsideration of this application.

Applicant acknowledges with thanks the Office's indication that claims 8-10 appear to be erroneously dependent on claim 1, whereas it was probably Applicants' intent for these claims to depend from claim 6. The Office is correct and Applicants have amended the claims accordingly.

Applicants respectfully thank the Office for the withdrawal of all of the section 112 rejections in view of the previous amendments and of the prior art rejections of claims 4, 5, 9, 10, 14-17, 21-24, 29-31, 36, 37, 41-45, and 49-52 in view of Applicant's previous arguments.

However, the Office has maintained the prior art rejections of the remaining claims, claims 1-3, 6-8, 11-13, 18-20, 25-28, 33-35, 38-40, and 46-48, based on the identical prior art references and arguments asserted against those claims in the previous Office Action. The specific prior art rejections are listed below for ease of reference.

1. Claims 1, 6, and 11 are rejected under 35 U.S.C. § 102(b) as anticipated by Hirano.

2. Claims 18, 26, and 33 are rejected under 35 U.S.C. § 102(a) as obvious over Hirano;

3. Claims 2, 3, 7, 8, 12, 13, 19, 20, 25, 27, 28, 34, and 35 are rejected as obvious over Hirano in view of Mansour & Gray;

4. Claims 38 and 46 are rejected as obvious over Hirano in view of Benesty;

5. Claims 39, 40, 47, and 48 are rejected as obvious over Hirano in view of Benesty as applied to claims 38 and 46 and further in view of Mansour & Gray.

Hirano is either the sole reference or the primary reference with respect to every prior art rejection in the Office Action. Applicant respectfully traverses these rejections on the same grounds as argued in response to the previous Office Action. Specifically, all of the prior art rejections are based on a fundamental flaw concerning the teachings of the primary reference, Hirano. The inventors on the present application have developed a frequency domain recursive least squares (RLS) algorithm for correcting for echo responses in a multi-stereo or other multi-channel environment. As far as Applicants are aware, they are the first to develop a technique meeting these three criteria (i.e., (1) frequency domain, (2) RLS, and (3) multi-channel). Hirano does not teach a frequency domain RLS algorithm.

The Office asserted that Hirano discloses a frequency domain RLS algorithm at column 17, lines 41-52, where Hirano mentions six different adaptive algorithms for echo cancellation by reference to third party references or by mere name. The cited portion of Hirano actually contains no disclosure of an algorithm within its four corners. Applicant had previously argued that none of those six techniques was a frequency domain recursive least squares (RLS) algorithm for correcting for echo responses.

The Office considered Applicants' argument and responded by asserting:

> However, the Examiner disagreed. As mentioned in the rejection above, Hirano shown in column 17, lines 41-52 that an RLS[recursive least squares] adaptive algorithm may be employed for the filtering process of echo estimate, and also, that the adaptive filter may operate in the frequency domain, this would have met the claimed limitation of frequency domain recursive least squares (RLS) algorithm being performed by the filtering process.
>
> As further evidence, Janse (US-6,546,099) is cited herein to show an echo canceller (see col. 3, lines 36-49) having adaptive filter operation under well known algorithm such as RLS algorithm is possible that the filter is operating in the frequency domain. Therefore, the argument deemed not persuasive and the rejection remains as stated above. (Underlining added).

Hirano, column 17, lines 41-52 is reproduced below.

> As an adaptive algorithm for the adaptive filters. algorithms such as the sequential regression algorithm (SRA) disclosed in B. Widrow et al., "Adaptive Signal Processing", (Prentice-Hall, N.J., 1985) or the RLS algorithm disclosed in M. L. Honig et al., "Adaptive Filters", (pp. 145-245, Kluwer Academic Publishers, Hingham, Ma. 02043, U.S.A.) can be employed. Alternatively, an adaptive recursive filter may be employed in place of an adaptive transversal filter. A further option is to use a sub-band adaptive filter or an adaptive filter of a "frequency domain" or "transformed domain." (Underlining added).

Janse col. 3, lines 36-39 also are reproduced below:

> In the echo canceller according to FIG. 1, the interfering component in the input signal z[k] is the signal e[k]. This signal e[k] is an echo signal caused by the reproduction of the far end signal by the loudspeaker 4. The adaptive filter 10 is arranged for deriving a replica e[k] of the signal e[k]. This is in general done by choosing the coefficients of the adaptive filter for minimising the correlation between the signal r[k] and the signal x[k]. There exist several well known time domain algorithms for adjusting the coefficients of the adaptive filter, such as the LMS (Least Mean Square) algorithm, the NLMS (Normalised Least Mean Square) algorithm and the RLS (Recursive Least Square) algorithm. It is also possible that the adaptive filter operates in the frequency domain.

Applicant notes that both Hirano and Janse share an unusual quality relative to the present rejection. Neither actually discloses an algorithm for echo cancellation. Both references merely refer to algorithms (by generic name or by reference to another publication). Therefore, the Office has not cited a reference that actually enablingly teaches any algorithm for echo cancellation, let alone a frequency domain RLS algorithm. Therefore, the rejection is prima facie improper. If, for instance, any of the references mentioned by Hirano discloses a frequency domain RLS algorithm, then it is that reference which must be cited, not Hirano. Hirano does not teach any algorithm for echo cancellation.

Applicant submits that the Office will not find a reference that discloses a frequency domain RLS algorithm.

Furthermore, what the Office may have failed to appreciate in connection with Applicants' previous response is that Applicants actually reviewed the references mentioned in column 17 of Hirano and confirmed that none of them disclose a frequency domain RLS algorithm.

It also appears that the Office is of the opinion that it is sufficient to support the rejection if the prior art collectively discloses (1) a time domain RLS algorithm and (2) that echo cancellation can also be performed in the frequency domain.

Specifically, the Office asserted that Hirano teaches that "an RLS [recursive least squares] adaptive algorithm may be employed for the filtering process of echo estimate, and also, that the adaptive filter may operate in the frequency domain".

With respect to Janse, the Office asserted that it "show[s] an echo canceller (see col. 3, lines 36-49) having adaptive filter operation under well known algorithm such as RLS algorithm is possible that the filter is operating in the frequency domain".

But Janse quite clearly states "There exist several well known time domain algorithms for adjusting the coefficients of the adaptive filter, such as the LMS (Least Mean Square) algorithm, the NLMS (Normalised Least Mean Square) algorithm and the RLS (Recursive Least Square) algorithm. It is also possible that the adaptive filter operates in the frequency domain". Thus, Janse essentially expressly states that there are time domain RLS techniques and there are other frequency domain techniques.

Thus, in both cases, the references note that there are RLS techniques available in the prior art and, separately, that there are frequency domain techniques available in the prior art. Quite clearly, a plain reading of both Hirano and Janse discloses that neither asserts a belief that there are RLS techniques that operate in the frequency domain or that the frequency domain techniques are RLS techniques.

Thus, in summary:

1. Neither Hirano nor Janse actually disclose any algorithm for echo cancellation. They both just refer to other references that have not been cited by the Office and, therefore, the rejections are prima facie improper;

2. Applicant actually has reviewed the third party references mentioned by citation and confirmed that they, in fact, do not disclose a frequency domain RLS technique;

3. The fact that a reference states that there are time domain RLS techniques and, separately, that there are frequency domain techniques certainly does not constitute a suggestion of a frequency domain RLS technique; and

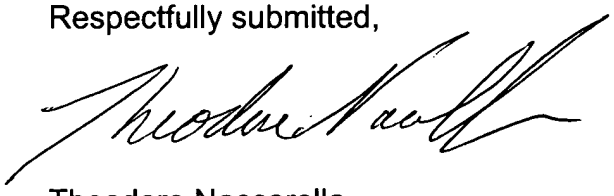
4. Even if it did, it certainly would not constitute an enabling disclosure of such a technique.

Thus, contrary to the Office's assertion, the prior art of record does not disclose a frequency domain RLS algorithm. Accordingly, all of the prior art rejections necessarily fail since the Office's assertion that Hirano teaches such an algorithm is the fundamental basis of all prior art rejections in the Office Action. All independent claims recite at least that the algorithm is a frequency domain RLS algorithm and, therefore, distinguish over the prior are of record.

Accordingly, Applicant respectfully requests the Office to withdraw all of the prior art rejections.

In view of the foregoing amendments and remarks, this application is now in condition for allowance. Applicant respectfully requests the Examiner to issue a Notice of Allowance at the earliest possible date. The Examiner is invited to contact Applicant's undersigned counsel by telephone call in order to further the prosecution of this case in any way.

Respectfully submitted,



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